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DRAFT TRANSLATION

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ON THE PRESENCE OF "MINOR" COSMIC RAY FLARE EFFECT IN MAGNETO-DISTURBED DAYS

(O nalichii effekta "malykh" kosmicheskikh luchey v magnitno-vozmushchennyye dni)

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ABSTRACT

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The effect of cosmic ray increase during magneto-disturbed days is, as an average, practically absent, or at least 3 – 4 times lesser than in quiet days. This is shown by the method of epoch superimposition by numerous chromospheric flares of force 2 and higher. Discussed are the possible causes of such phenomenon.

Author

COVER-TO-COVER TRANSLATION

It is well known that at time of Earth capture by a solar corpuscular stream, a decrease in cosmic ray intensity is often observed simultaneously with the magnetic storm. This decrease is currently explained by scattering of primary commis rays by frozen-in magnetic fields within corpuscular streams[1]. The study of solar cosmic ray behavior during these periods offers interest. No doubt, they also must

be subject to a substantially greater scattering than that of galactic cosmic rays, inasmuch as the Sun-generated particle energy is quite low.

It was shown in [2] that in solar activity maximum cosmic ray flares of 2 index and higher cause in the cosmic ray neutron component an intensity effect with an amplitude [illegible]nth of fractions of one percent. At the same time selected were chromospheric flares observed during the days when there were no magnetic storms on Earth, no notable intensity decreases and no major daily cosmic ray variations, i. e. during days, when according to contemporary concepts, the Earth was not inside solar corpuscular streams.

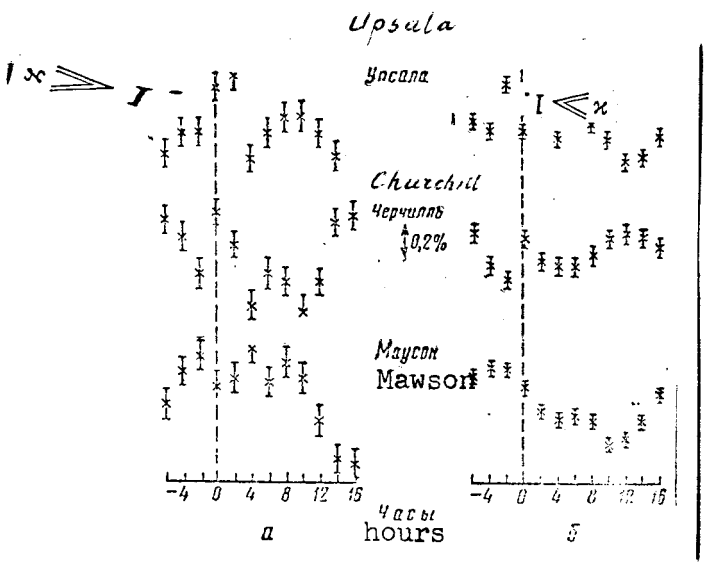

Fig. 1

Let us set up the reverse question: Do solar flares taking place at the time the Earth is within corpuscular streams, exert any effect in cosmic rays? — To answer this question 214 flares of force 2 and above taking place in perturbed days have been sorted. Data on flares were borrowed from reference [3].

The statistical averaging of the observation data of the intensity of cosmic ray neutron component at Upsala, Churchill, Resolute Bay and Thule was effected by the method of epoch superimposi-

tion, the zero hour being the time of solar flare commencement. In order to exclude the solar-diurnal variations from the results of averaging, the 12th and 24th hour-harmonics, computed according to observation data for the day preceding the studied flares, have been substracted. (The exclusion of the total solar-diurnal variation for the preceding day gave the same results.

Let us exa... first of all whether there are zones falling into magneto-disturbed days. Plotted are in Fig. 1 a the averaged data by the following stations: Upsala (26 flares), Churchill (45 flares), (19 flares), when these stations were in the 9th and 4th-hourly zones of getting into. Fig. 1 б gives the data, averaged by the same stations when they were outside of the falling-in zone for solar particles (127 flares were averaged at Upsala, 130 at Churchill, 146 at Mawson). It may be seen from the data brought out that the effect of increase within the limits of statistical errors is not revealed. Even if this effect existed, it should in no case be significantly lesser than in quiet days [2]. Hence, it follows, that during the perturbed periods the Earth is substantially shielded from solar cosmic rays, so that their flux toward the Earth becomes substantially smaller (no less than 2 — 3 times), than during the quiet days.

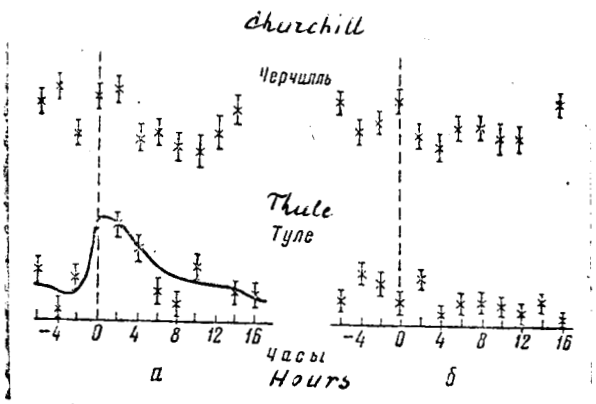

Fig. 2

An analogus analysis by a flare group, having occurred in the daytime (from 0800 to 1800 hrs) and in nighttime (2000 to 0600 hrs) at Upasala (99 flres in daytime and 69 — in nighttime), Resolute Bay (respectively 180 and 108), Thule (53 and 101), leads to identical results (see Fig. 2).

Let us examine the effect of flares in perturbed days depending upon the part of the solar disk the said flares took place in. The results of averaging for Churchill and Thule stations by the group of flares having taken place in the western part of the solar disk, are plotted in Fig. 2a (22 and 61 solar flares were respectively averaged for Churchill and Thule). Similar results are shown in Fig. 2 б for flares having taken place in the eastern part of the solar disk (23 and 41 flares were respectively averaged for Churchill and Thule). These data show that the effect of minor solar flares is apparently absent or is in any case significantly lesser than in quiet days [4]. A small effect, with an amplitude of $0.3 \pm 0.1\%$, may apparently by noted at Thule for flares having taken place in the western part of the solar disk. Comparison with data of Fig. 3 in [4] indicates that this effect is at least 3 to 4 times lesser than in quiet days.

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